SIMULATION, TEST AND EVALUATION PROCESS

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WHY CHANGE?

OVERVIEW

We must move to a **fundamentally different** way of acquiring weapon systems

Greater and more integrated insertion of **modeling and simulation** (M&S) into acquisition shows promise for helping

The **Simulation, Test, & Evaluation Process (STEP)** is a key enabler

We **collectively** need to take **positive** steps **now** if we are to exploit the potential benefits

ACQUISITION REFORM

Reengineer the Acquisition System (SecDef - 2/09/94)

- **Requirements determination (what to buy)**
  - Use performance-based requirements
  - Analyze requirements determination processes (including assessing the use of Simulation as a tool to facilitate formulation and re-evaluation of requirements during acquisition process)

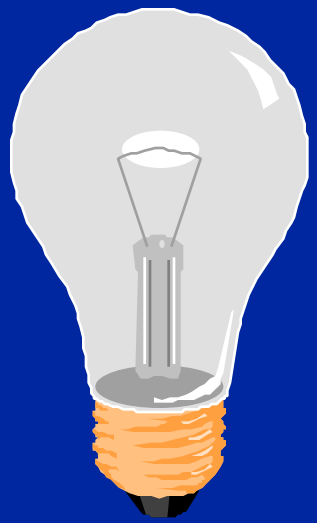
- **DoD Acquisition Process (how we buy)**
  - Dramatic reduction in standards and specifications
  - DoD organizations as value-added participants, not inspectors
  - Focus on process control rather than hands-on inspections
  - Tests performed to add maximum value to the overall process
  - Maximize use of technology to enable re-engineering of the process

ACQUISITION REFORM - DoD 5000.2-R

- **Test & Evaluation shall begin in Phase 0**
- **DT and OT shall be involved early to ensure that the test program can support the acquisition strategy and to ensure the harmonization of objectives, thresholds, and measures of effectiveness (MOEs) in the ORD and TEMP**
- **Linkage between MOEs, Measures of Performance (MOPs) used in the analysis of alternatives or ORD, and T&E**
- **Modeling & Simulation (M&S):**
  - Integral part of test planning
  - Be applied throughout system life-cycle
  - Program managers (PMs) shall:
    - Integrate M&S within program planning activities
    - Reuse models and simulations
    - Integrate M&S across functional disciplines

OLD PARADIGM

Q: How many testers does it take to change a light bulb?



A: None, we just report that it's dark!

CHALLENGE

- **Re-engineer Test and Evaluation Process**
- **Build the Infrastructure**

RE-ENGINEER TEST & EVALUATION

STEP DIRECTION

“ I am requiring that the Simulation, Test and Evaluation Process-let’s call it STEP-shall be an integral part of our Test and Evaluation Master Plan (TEMPs). This means our underlying approach will be to model first, simulate, then test, and then iterate the test results back into the model.”

Honorable Paul Kaminski

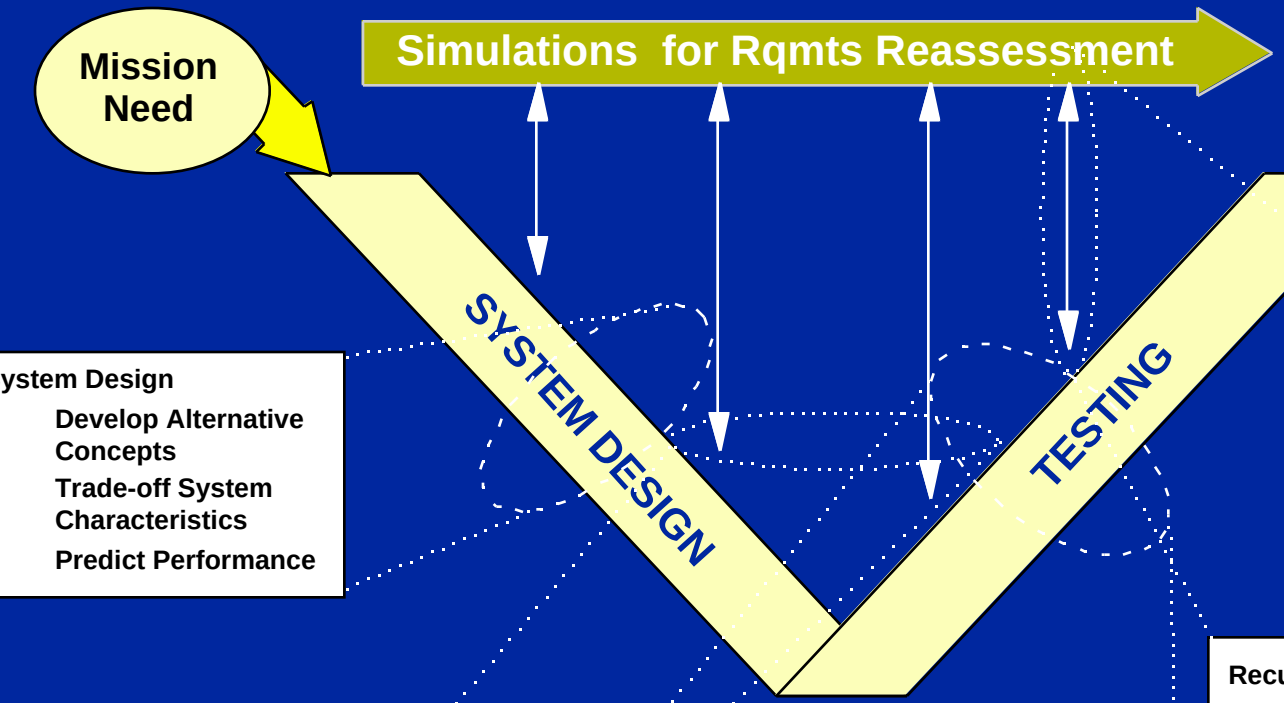
USD (Acquisition & Technology)

NEW PARADIGM

SIMULATION TEST AND EVALUATION PROCESS (STEP)

Iterative process that integrates both simulation and test for the purpose of evaluating the performance, military worth, and effectiveness of systems to be acquired.

THE STEP CONCEPT



System Design
- Develop Alternative Concepts
- Trade-off System Characteristics
- Predict Performance

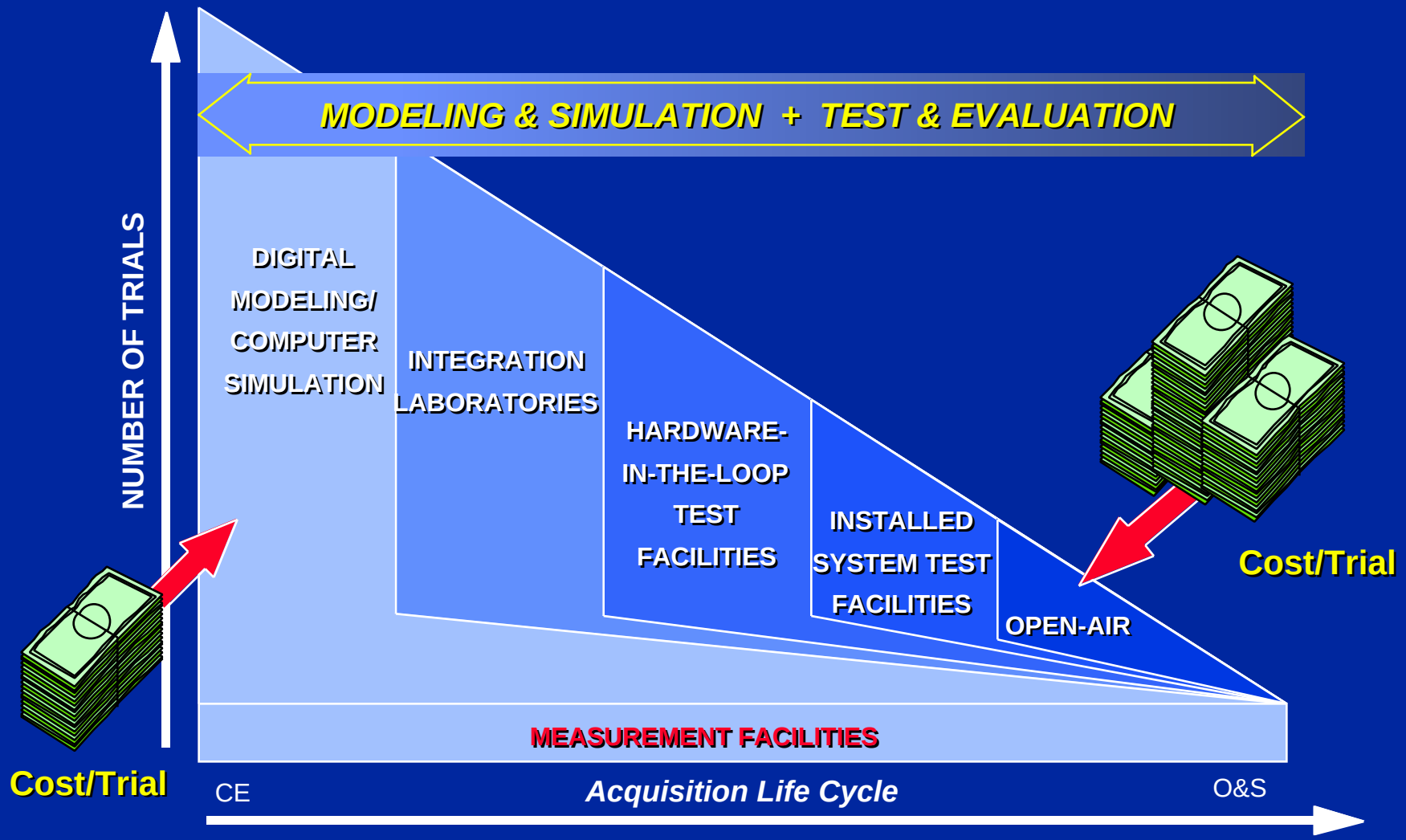
Thru Lifecycle
- Continued Assessment of Performance
- M&S for Future Use

Design Development
- M&S Used to Evaluate System Design
- Test Processes and Facilities Simulated
- M&S Support Preliminary Design Review

Testing
- Model-test-model
- Test Planning
- Predict System Performance
- Conduct Rehearsals & Explore Test Limitations
- Live Test to Support M&S Credibility
- M&S Used to Supplement Live Test Events

Recurring Assessments
- Recurring Examination of System Military Value
- Feed Updates to High Level Models after each Design Change
- Impact of Design Changes Highlighted
- Honing of Requirements

THE SPECTRUM OF TOOLS



STEP FUNDAMENTALS

Begins with a realization that models will be a product of system development

Includes a continuous re-evaluation of reqmts during the acquisition with cost as an independent variable

Provides a linkage from the ORD to test

- COIs, MOEs, MOPs plus analysis methodology

STEP methodology reflected in the TEMP

- Include description of DT&E and OT&E relationship
- Testing aligned with M&S maturation schedule and program milestones

STEP FUNDAMENTALS

Testing focused on evaluating military worth

- Effectiveness and suitability
- Expect few design specifications on which to base testing

Testing designed to validate the models; models used to extrapolate tests

Provide methodology for updating M&S with test data

- Verification, Validation & Accreditation/Certification plans
- Data must have documented “pedigree” for legacy

Uses credible data for evaluation

- Best balance of source: simulated and live events
- Implies cost-benefit analysis

ACCEPTANCE - ISSUES

- **Program Management buy-in and funding of STEP**
  - ≈ Need to expand their understanding of intent and benefits
  - ≈ Welcome tester participation up-front & early (likely via IPTs)
- **Industry buy-in: Government-Industry T&E partnership without DoD-mandated practices**
  - ≈ Mutually agreeable vision and implementation approach
  - ≈ Accepted government T&E role as part of team
- **Powerful overarching leadership to champion cause at high levels and keep effort focused**
- **T&E community acceptance and understanding is equally important for timely and effective implementation**

RE-ENGINEERING - ISSUES

- **Leadership oversight and impetus to support shift to STEP**
- **Internal process changes within organizations to reflect STEP**
  - ≈ New test methods, management & over-arching philosophy likely
    - ≈ Essential to reduce time and cost while increasing value-added
    - ≈ Ease interface with M&S processes and infrastructure
  - ≈ Lower-level investment requirements likely
- **Manpower may need some retraining**
  - ≈ Change in nature of work for the common tester
  - ≈ Downsizing will require that non-value added activities be greatly reduced

WHAT DO WE WANT YOU TO DO?

Re-examine your acquisition strategy

- Is M&S integrated effectively throughout?
- Have you invested in M&S to be used downstream?
- Do you have a cradle-to-grave perspective?

Re-examine your test strategy

- Are the testers involved from Phase 0?
- Is STEP incorporated?
  - Refer to “Comparison of Test Paradigms” viewgraph
  - Does the TEMP reflect planned use of M&S in testing?
  - Are T&E and design activities integrated?

WHAT DO WE WANT YOU TO DO?

Use suitable legacy models and contribute your own

- Build a digital systems model of your system
- Are you planning for model reuse and interoperability?
- Are you prepared to perform VV&A and VV&C?
- Do you have resources to feed test data back into M&S?
- Is the M&S maturation well planned and documented?

Identify required changes in your program and DoD process

- What's needed to infuse M&S & STEP into your program?
  - Acquisition & PPBS process changes
  - M&S infrastructure - your own and DoD wide
  - M&S enabling technologies
- How much can you afford?

WHAT DO WE WANT YOU TO DO?

Develop a partnership with industry

- Share data
- Acquire unique models with the system as necessary
- Government provide a synthetic environment to evaluate the system
- Ensure models are interoperable with other government models and simulations
- Perform M&S verification, validation and accreditation (VV&A) jointly

SUMMARY

Considerable evidence of cost, schedule, productivity and quality/performance pay-back through use of M&S within the context of SBA

STEP provides guidelines for implementing insertion of M&S into acquisition and test

- Bridges the gap between requirements and fielded system
- Is a process for value-added, efficient, and integrated testing
- Testing designed to help validate the models - Credibility!

We must move forward promptly to exploit these tools